Nutrition News

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FOOD FOR THE TEEN-AGER

By

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What should the teen-ager eat? How much should the teen-ager eat? These are questions of concern to the teen-ager, to his parents and to the nation. The health and well-being of this segment of our population is of paramount importance, for teen-agers are tomorrow's citizens and the potential parents of tomorrow's children.

Nation-wide Survey

Recent cooperative researches, [1, 2] on nutritional status were sponsored by the State Agricultural Experiment Stations, the Institute of Home Economics of the United States Department of Agriculture, and several state Departments of Health. Over 4,000 adolescents, aged 13 to 20 years, were studied in 14 states. Dietary intakes, blood composition and physical examination were usually included.

The appraisal of nutrient intakes of some 2400 teen-agers was directed to the 1958 revision[3] of the National Research Council recommendations. The boys' mean daily intakes at all ages were generally adequate or more than adequate with respect to protein, calcium, iron, vitamin A, riboflavin and niacin. Intakes were substandard for calories and ascorbic acid at all ages, and were somewhat low for thiamine at 16 and 18 years of age.

The girls' mean daily intakes at all ages revealed large deficits of calcium and iron; and smaller ones for calories, protein, thiamine and ascorbic acid. Riboflavin in the diet was somewhat low at 16 and 18 years of age. Only vitamin A and niacin contents were as high or higher than the recommended amounts for girls throughout adolescence.

Regional Differences

With the criterion for inadequacy established at less than two-thirds of the recommended allowances, the adolescent boys and girls in six western and two northeastern states had the most deficits in calcium and ascorbic acid. The greatest number of these deficiencies were found among the Spanish-American children of New Mexico and the teen-agers in Colorado. From 40 to 70 percent of these children had deficits in calcium and ascorbic acid, and only a slightly smaller number had deficiencies of thiamine, riboflavin, niacin and vitamin A. From 30 to 40 percent of the Colorado girls and also the Spanish-American girls in New Mexico had less than two-thirds of the recommended amount of protein.

The Anglo-New Mexican children had fewer deficits in every case than the Spanish American subjects, but in general they had more than Oregon children. Adolescents in the northeastern region had fewer deficits than those in the western areas except for calcium and vitamin A and for protein in the boys. Only a few of the Oregon children had less than two-thirds of the recommended amount of protein, vitamin A, thiamine, riboflavin or niacin, but approximately 20 to 30 percent of these children had deficits in ascorbic acid, iron and calcium. Iowa children, 12 to 18 years old, had similar patterns of intake, with more children in the 15 to 18 year category having deficiencies than in the younger group. In nearly all states a larger proportion of girls, than boys, had dietary deficiencies.

More Observations and Comments

In general, blood analyses conformed with values anticipated from the dietary intakes. Physical symptoms of marginal nutritional deficiencies occurred most often in groups with low blood levels of vitamin A and ascorbic acid, but did not always correlate with the dietary intakes. More underweight than overweight was observed in adolescent boys, yet the opposite was noted in the girls.

Food is abundant and nutrition education is included in elementary and secondary schools, yet teen-age girls

Dr. Jones

comprise the most poorly fed group in our population. The adolescent is obdurate to attempts of parents and teachers to alter his food habits. The free choice of food and drink appears to be an area of independence which he uses to express his approaching adulthood. Effective nutrition education must make the teen-ager aware of his needs. It must supply sufficient information to motivate him to make his own evaluations, and finally to institute a food consumption program which will permit him to round out his physical growth and to live abundantly. The accomplishment of such an education program presents a challenge to our nutrition educators and demands the use of the newest and most effective techniques.

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1. Morgan, A. F., Ed.: *Nutrition Status U.S.A.*, an Interregional Res. Pub., Calif. Ag. Ex. St. Bull. 769, 1959.
2. Morgan, A. F. and Odland, L. M.: *The Nutriture of People*. Food, Yearbook of Ag. USDA, Wash., D.C., 1959, p. 186-224.
3. *Recommended Dietary Allowances*. Pub. 589. Nat. Acad. Sci.—Nat. Res. Council, Wash., D.C., 1958.

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Glances AT NUTRITION RESEARCH

Adolescence is a very busy period in human life. Rapid growth takes place for two or three years while other maturing processes continue for eight years or more. The total effect is stress—physical, physiological, psychological, emotional, and social.

Healthy Skin—Acne vulgaris is a chronic inflammatory disease of the sebaceous glands. It occurs predominantly in teen-agers and brings with it many of the psychological and emotional problems which characterize adolescents. Acne patients should be placed on a well-balanced diet which will prevent excessive gain in body weight. This diet should include all of the nutrients in the National Research Council's Recommended Dietary Allowances. The teen-ager with acne needs also sympathetic interest on the part of his physician, family, and friends.

—J. Am. Diet. Ass. 35:923, (Sept.) 1959.

Weight Control—Obesity is a teen-age tribulation. It occurs more frequently among adolescent girls whose diets are poor. Fatness often results from too little muscular activity rather than too high a caloric intake. Overweight young persons should be encouraged to participate in athletics. The possibility of dietary deficiencies must be considered. "This may call for better breakfast habits and better between-meal snacks. We must eradicate the mistaken idea that 'milk is fattening', that meat and potatoes is a meal for men, that vegetables are only for girls. We must apply the principles of good nutrition."

—Today's Health, p. 3, March, 1958.

Extra Food—More than three meals a day are needed by teen-agers, particularly during the period of rapid growth. Much of this extra food is taken as snacks which can be nutritional assets or empty calories. The teen-ager who chooses his snacks from the following four food groups will meet part of his daily nutritional obligation: milk group, meat group, vegetable-fruit group, and bread-cereals group.

—Food, The Yearbook of Agriculture, 1959, U.S.D.A., p. 305.

Exercise and Fitness—Muscular strength reaches a maximum in early adulthood, earlier in women than in men. A gradual decline usually begins during the thirties and forties. The heart and circulatory system also decline in functional efficiency and the rate of decline varies to some extent on the exercise habits in adult life. The maintenance of fitness depends upon exercise, adequate nutrition, sufficient rest and relaxation, suitable work, medical and dental care, and the avoidance of excesses.

—J.A.M.A., April, 1958. Statement by Joint Comm. of A.M.A. and A. A. Health, Phys. Ed., and Rec.

Dr. Jones

Evelyn M. Jones received both her undergraduate and master's degrees from the University of California in Los Angeles, and her doctorate from the University of Wisconsin.

A teacher of foods and nutrition, Miss Jones remains active in research relating to calcium metabolism, amino acid requirements of women, energy metabolism, cholesterol metabolism, and protein.

Health Forum

The National Health Council, through a National Health Forum to be held March 14 to 17, 1960, in Miami, Florida, will seek to remove some of the present obstacles to more positive health for older people. They hope to stimulate a wider application of today's knowledge in this area by individuals, families and communities.

Editor's Note

Resumés on page 3 do credit to two research teams working independently on the effect of milk in the diet of the athlete. For those more deeply interested in these studies, reprints of the full research reports will be available from the respective authors.

EFFECT OF MILK CONSUMPTION ON ENDURANCE PERFORMANCE*

By Wayne D. Van Huss, Ph. D., Gale Mikles, Ed. D., Evelyn M. Jones, Ph. D., Henry J. Montoye, Ph. D., and Dena C. Cederquist, Ph. D., Department of Health, Physical Education and Recreation, and Department of Foods and Nutrition, Michigan State University

How, when or where the belief originated that milk hinders athletic performance is unknown, but the inclusion of milk in the diet of athletes in training remains a controversial topic. There appear to be as many pro-milk coaches as there are those who restrict its use.

The effect of milk consumption on endurance performance had not been studied under controlled conditions. Where milk was withheld from the diet without nutritional guidance, it was not known what diet substitutions were made or whether an adequate diet resulted. These problems were investigated in our study for a time approximating the usual competitive season.

Pre-Test Training

Seven freshman track candidates and two experienced endurance runners were selected as subjects. The men, except for one subject aged 32, ranged in age from 19 to 24 years. They trained for three weeks on a motor-driven treadmill, running to exhaustion twice each week at 10 MPH up an 8.6

Bob Lake gets physical checkup before test run on treadmill.

percent grade. Three times each week during the training period the subjects also ran on the flat at varying speeds to determine the fastest rate at which all subjects could attain a steady state and continue for a minimum of 15 minutes. Steady state was assumed when the pulse rate leveled off and did not increase during the 15-minute run.

* *Supported in part by a National Dairy Council grant.*

Diet Patterns Studied

Two groups of four subjects were assigned by a blind draw to the milk and non-milk groups. One extra subject, age 32, was assigned to the non-milk group. The subjects in the milk group consumed a minimum of three pints of milk a day plus about two pints of ice cream each week. The non-milk group was not permitted any milk, cheese, or ice cream—although milk was used for cooking. All but 3 subjects ate in the same dormitory dining room. During the experiment, all subjects trained in track.

Lake helps Crawford Kennedy adjust Douglas Bag apparatus to collect expired metabolic gases.

One week before the experiment, recall diets, including meals and snacks, were secured for the previous twenty-four hours. During the first experimental week, recall diets were taken for each twenty-four hour period. During the last week of the experiment, subjects were interviewed on three days for comparison with the previous record. The two weeks of recall diets were analyzed and compared with the dietary recommendations of the National Research Council (1958).

The Experiment

During the eight weeks of the experiment, weekly measurements were made of weight, sitting metabolism and respiratory quotient, exercise oxygen intake, exercise respiratory quotient, recovery oxygen intake, recovery respiratory quotient, and derived measures

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MILK AND ATHLETIC PERFORMANCE*

By Dale O. Nelson, Ph. D.,
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Many controversies have centered around the use of milk by people participating in athletics, particularly on the day of competition. Our purpose was to study the effect of varied amounts of milk in a balanced diet as it relates to athletic performance.

Since milk contributes substantial amounts of protein, it was felt that protein might be a contributing factor in any cause and effect relationship between milk, diet and physical performance. Hence protein at three levels was included as a variable. The experimental design permitted a study of milk, other protein foods, and milk combined with other protein foods.

Twenty-four Utah State University athletes representing the competitive sports of football, basketball, track and field, and wrestling took part in the study. Physical examinations found them in excellent condition, weighing from 135 to 240 pounds.

A 3 x 3 factorial selection of treatments included three levels of protein (10.0, 13.4 and 16.8 percent of the total calories), and three substitution amounts of milk (0, 1 and 2 quarts per day). This resulted in nine diets.

It was impossible to have each subject undergo all nine treatments, so an experimental design was set up to aid in the statistical treatment of the data. Twelve pairs were chosen among the athletes, and each pair of subjects spent seventeen days on each of three diets. A given diet consisted of an initial three-day adjustment period, followed by two weeks of sustenance on the diet. Measurements were taken on each individual the last three days of the controlled diet period. Milk was consumed on test days the same as other days. This included consumption of milk within one hour of testing.

Gross motor tests were selected to test such basic components as speed and reaction time, power (vertical), and strength and endurance. These items are believed to be a part of athletic types of activity, and results on another study had indicated high precision. The tests were given in sequence so the effects from one test to another would be uniform: Test 1 — Starting and Running; Test 2 — Vertical Jump; Test 3 — Bicycle Ergometer.

During test periods, heart rates and

* *Project supported by American Dairy Association grant.*

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during and following a 15-minute "steady state" run at 6 MPH with no incline on the motor-driven treadmill, while subjects were in a post-absorptive state. Each subject was tested on the same day of the week at the same time. Twice weekly, subjects ran to exhaustion on the treadmill at 10 MPH up an 8.6 percent grade. To create a competitive situation, the subjects were tested in groups. These tests gave no evidence that milk in the diet had any adverse effect on the performance of the subjects, even when ingested just prior to the testing period.

Nutrient Intakes

In the pre-experimental period all diets were nutritionally adequate. When one group of subjects eliminated milk, cheese and ice cream from their diets, the protein intake, though adequate, was decreased, but calcium and riboflavin intakes were inadequate. The vitamin A intake, which was slightly below the Recommended Dietary Allowances in the pre-experimental period, was further reduced by the restriction of milk, and fat intake was decreased. In this group, the calorie intake was maintained at about the same level by the self-selection of fruits, cereals, gravies, desserts, soft drinks, and candies. The high intake of carbohydrate foods, as desserts, soft drinks and candies, was not nutritionally desirable, since calories were accompanied by very few other nutrients.

That the subjects' performance was not impaired reflects the adaptation of the body to reduced intakes of these nutrients. In an experiment of this length, impairment of performance was not expected; however, if dietary restrictions were continued over a longer period, as is possible with a boy participating in two or three sports during the year, it seems that dietary inadequacies could impair performance and general health.

Our study found that when milk, cheese, and ice cream were eliminated from the diet, the calorie level was maintained by the addition of self-selected foods primarily of carbohydrate content. Under these conditions, the nutrients, especially calcium and riboflavin, fall below recommended levels.

The folk tale that milk drinking during training and before competitive trials causes "cotton" or dry mouth and excessive gas formation which impairs performance was disproven by this study. There is no justification for excluding milk from the diet. There are valid nutritional reasons for including milk in meals for athletes.

THINGS YOU'LL LIKE TO READ

Your Community, School - Community Fitness Inventory. American Association for Health, Physical Education, and Recreation. Nat. Ed. Assoc., Washington, D.C. 1959. 75¢ per copy.

This booklet provides an inventory designed to test community efforts and resources in achieving an active fitness program. Helpful in identifying strengths and weaknesses as the first step in providing an effective program.

Food—The Yearbook of Agriculture, 1959. Alfred Stefferud, Ed., U.S. Dept. Agr., Supt. of Documents, Wash., D.C. $2.25.

The contributors and editor of this book are to be commended for an authoritative reference that is enjoyable to read while it brings the details of nutrition into proper focus and counteracts the half-truths or falsehoods about food and the American diet which are so prevalent today. Hits all age groups.

DID YOU KNOW?

—that 60,000 public schools across the nation used more than $597 million of food at wholesale value in 1958, and milk and milk products accounted for over $231 millions?

—that, hard pressed to feed an ever-increasing population, man may one day turn his attention to certain kinds of insects, for it is difficult to reason why we eat quantities of crabs and other shell fish but disdain the equally clean, palatable and nutritious insects?

—that there are only 135 Calories in the modest dip of ice cream, 1/9 quart, usually served in restaurants as dessert with a meal?

—that the Arabs are said to be the first to use other-than-human power to churn butter?

—that cheese made from pasteurized milk is more uniform in quality?

MILK AND ATHLETIC PERFORMANCE*

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blood pressures were taken for each subject. Data were analyzed with the same procedures used on the gross motor tests, but no significant differences were found.

In this controlled study where the use of milk was compared with no milk, the continuing claims of milk adversely affecting performance were not substantiated. There was a tendency for one quart of milk and the high protein diet to coincide with best performance.

All levels of protein were considered adequate, but no wide differences in performance were found when the amounts were varied to include unusually high levels. This indicates that as long as protein is adequate in the diet the amount, whether in milk or not, does not make any difference on the performance as measured by these tests. When protein contributed ten percent of the total calories in a 4000 Calorie diet (which was the low protein diet), one quart of milk daily furnished one third of the total protein needed in the diet. Where small men were concerned and 3000 Calories were used, one quart of milk contributed approximately one-half of the total protein.

It seems that a diet adequate in every respect contributes the necessary fuel for the body to perform well in big muscle activity. Coaches and participants need not be alarmed over the use of milk on the day of competition. Since milk is an excellent source of many of the required nutrients, it can be recommended in the diet of athletes.